REMARKS

Claims 1-32 remain in the application. Reexamination and reconsideration of the application are respectfully requested.

Claims 1-32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki USP 6,185,040 in view of Miron USP 7,002,696. Claims 33-38 were rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki in view of Miron and Ranalli USP 6,285,500. The rejections are respectfully traversed.

Rejection of Claims 1-32 Under 35 U.S.C. §103(a)

Claims 1-32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki USP 6,185,040 in view of Miron USP 7,002,696. The rejection is respectfully traversed for the reasons set forth in the prior Amendment Under 37 CFR 1.111 filed September 3, 2008; Amendment Under 37 CFR 1.116 filed February 26, 2009; and Amendment Under 37 CFR 1.114 filed March 26, 2009, all of which are incorporated herein in their entireties and further supplemented herein. As detailed therein, the claims are directed to methods and systems comprising a number of elements in combination. Amended claim 1, for example, is directed to a transmitting system comprising a processor, an integration lens, an optical fiber and a variable reflectivity surface. The variable reflectivity surface varies in reflectivity along its length and is configured to impart a desired amplitude profile onto the output taps.

In the latest Office Action, the Examiner responds to Applicants' most recent arguments that Miron fails to teach a surface having a variable reflectivity and that Shirasaki fails to teach spatially distinct beam. In connection with the former, the Examiner states:

> As noted in the office action, Miron clearly provides a variable reflectivity surface that varies in reflectivity thereby allowing adjustment to the optical path difference (OPD) which is an even multiple of the elementary optical path difference (EOPD) and further allows control over optical intensity of the output beams (column 7 lines 1-10). Furthermore, the variable reflectivity surface can be broadly considered as being variably reflective along its length being that the light which propagates the length of the reflective surface encounters reflective materials which vary from fully

> reflective to partially reflective to fully reflective to partially reflective, etc. Moreover, applicant's reading of a "surface" is overly narrow, and the examiner considers the elements 201- 206 as the claimed surface, thereby further substantiating the examiner's arguments that Miron teaches a variable reflectivity surface.

Office Action of May 29, 2009 at pages 8-9.

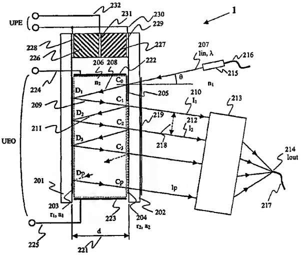
Even if, as asserted by the Examiner, there is an "an even multiple of the elementary optical path difference (EOPD) and further allows control over optical intensity of the output beams"(citing to Miron at column 7, lines 1-10), this is not the same as having a surface with a variable reflectivity. To the contrary, Miron describes that plates 201 and 202 have flat surfaces, plate 201 with a near total to totally reflective layer and plate 202 with a partially reflective layer. There is no mention or hint that the reflective layers are other than as stated, either entirely or partially reflective much less having a variable reflectivity:

> The interferometer comprises two transparent optical plates 201 and 202, positioned in parallel relationship so as to present facing sides to each other. Both of the plates 201 and 202 have flat surfaces. The plate 201 has a flat near total to totally reflective layer, coating or medium 203 with a reflection coefficient r_1 and an absorption coefficient a_1, on the side facing the plate 202. Here, as well as elsewhere herein, the expression "near total" or "totally reflective" means that very little or no part of a beam's intensity will pass through the reflective layer 203, when said beam is incident on the reflective layer 203. The plate 202 has a flat partially reflective layer, coating or medium 204 having a reflection coefficient r_2, an absorption coefficient a_2 and a transmission-optimized optical layer, coating or medium 205, optimized for maximum transmission of an input beam(s), on the side facing the plate 201. Here, as well as elsewhere herein, the expression "partially reflective" means that a portion of a reflective light beam 208, that is, its intensity, incident on reflective layer 204 passes through it becoming an output beam 210. The plate 202 also has a transmission-optimized optical layer, coating or medium 219, optimized for maximum transmission of output beam(s), on the side (opposite to) not facing the plate 201, where the output beams are coming out of the interferometer.

Miron at col 8, line 60 – col. 9, line 17.

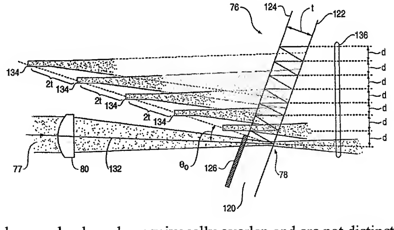
Not only does Miron not teach a variable reflectivity surface, but instead discloses only a high reflectivity coating thereby teaching away from a variable reflectivity surface.

The Examiner's reasoning is further flawed in that there is no basis to consider different reflectivities of different surfaces to be equivalent to a variable reflectivity surface which varies in reflectivity along its length. Miron not only describes that plates 201 and 202 are separate, but depicts them in opposition (see Fig. 2A of Miron at right.) Contrary to the Examiner's assertion, Applicant's reading of a "surface" is not overly narrow but is supported by the common meaning of the term, Applicants' disclosure and the applied art. A surface is not multiple surfaces on separate and distinct structures. Nor is it reasonable for the Examiner to "[consider] the elements 201- 206 as the claimed surface, thereby further substantiating the examiner's arguments that Miron teaches a variable reflectivity surface" as doing so is contrary to, *inter alia*, Miron's disclosure which clearly describes element 201 and 202 as having separate surfaces not a common surface.



The Examiner's assertion that Shirasaki's beams are clearly distinct at surface 122 is also mistaken. As depicted in the diagram at right in which virtual images 134 of Shirasaki's Fig. 7 are extended to show where each impinges on reflecting surface 122, the beams clearly and unequivocally overlap and are not distinct at that surface.

FIG. 7



Further, because the beams do overlap, the Examiner's assertion that "Shirasaki clearly teaches that each of the spatially distinct beams are independently phase shifted by virtue of the fact that each beam is delayed, or phase shifted, a predetermined amount with respect to the other beams" is based on a false premise of spatially distinct beams such that the conclusion is likewise flawed.

Because the Examiner's reasons for considering Applicants' prior arguments to be unpersuasive are themselves erroneous for the reasons presented, reconsideration of those arguments is requested. In particular and as previously argued, in contrast to the rejected claims, neither Shirasaki nor Miron, singularly or in combination, disclose or suggest a similar combination of elements. The Examiner's application of Miron to supplement the disclosure of Shirasaki fails to rehabilitate the rejection, neither teaching or suggesting a combination including a variable reflectivity surface that varies in reflectivity along its length and is configured to impart a desired amplitude profile onto output taps. Contrary to the position taken by the Examiner, there is no teaching or suggestion in Miron or in any other cited reference of a combination including a variable reflectivity surface that varies in reflectivity along its length.

1. The Examiner's Reliance on Miron is Misplaced

The Examiner cites to Miron at "column 9 lines 23-49 [as] describing [a] variable reflectivity surface ..." Office action at page 3, line 10. It is respectfully urged that such is not the case. Instead, the cited portion Miron fails to disclose, suggest or even hint at a variable reflectivity surface. The cited portion of Miron discloses only an adjustable index of refraction in the transparent non-reflecting part of the device and a variable spacing of the reflective plates. Neither of these variabilities has anything to do with variable reflectivity along the length of a surface. The two variabilities described affect tuning of the response of the device in wavelength. In contrast, the claimed variable reflectivity along the length of a surface affects the spatial spot shape at the focal plane of the device. These are two completely different effects resulting from two completely different variables.

The Examiner's analysis is also flawed in connection with variations in light intensity. In particular, the Examiner takes the position that Miron, at "column 10 lines 5-44 [discloses] variation in reflectivity from total reflection to partial reflection as light traverses the reflective device." This conclusion is not correct; the cited section of Miron has nothing to do with variable reflectivity. To the contrary, this cited portion explicitly verifies that Miron's device uses constant reflectivity along the length of the surface. Specifically, Miron at column 10 lines 41-44 discloses that the intensities of the beam inside the propagating medium and the intensities of the output beams are both decreasing in "geometric regression." Such "geometric regression" only occurs if the reflectivity along the surface of the device is constant varying as claimed. Having a reflectivity that varies in contrast, in embodiments according to the present application, the reflectivity can be tailored to generate output beams that have a Gaussian variation in intensity along the surface of the reflector. It appears that the Examiner may be confusing a geometric decrease in the light intensity with a geometric decrease in reflectivity; the reflectivity according to Miron does not vary, only the light intensity changes.

The Examiner's position that Miron discloses a "variable reflectivity surface in order to allow for tuning of the optical device" (citing column 12 lines 20-26 of Miron) is likewise in error. Again, Miron does not disclose or suggest a variable reflectivity surface. Instead, the variability that Miron discloses is in wavelength tuning (via change in index of refraction, plate spacing, or incidence angle) and has nothing to do with variable reflectivity along the surface of the device.

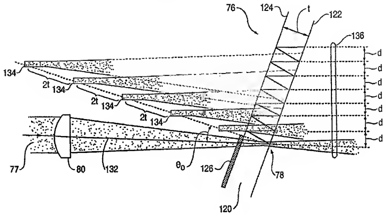
Finally, for the reasons presented above, it is improper to interpret the separate and distinct surfaces of Miron's plates 201 and 202, each having a constant reflectivity, to be equivalent to Applicants' variable reflectivity surface.

2. The Examiner's Characterization of Shirasaki is Erroneous

The Examiner's characterization of Shirasaki is also flawed. For example, at page 4 of the Office Action the Examiner takes the position that the outputs are "spatially distinct (Figure 7)". While Figure 7 as drawn might, at first glance, give one the impression of "distinct" beams,

extending each beam all the way to the surface 122 would make it apparent that the beams greatly overlap at surface 122, with the overlap becoming greater for each successive output tap. Thus, Shirasaki's beams are clearly not collimated and the beams are <u>not</u> "distinct" at surface 122. See, e.g., Fig. 7 of Shirasaki at right in which virtual images 134 have been extended to show where each impinges on reflecting surface 122, the beams clearly and unequivocally overlaping and are not distinct at surface 122.

FIG. 7



The Examiner's statements that the outputs of Shirasaki are "independently phase shifted" citing to column 9 lines 46-47, is likewise incorrect. In fact, Shirasaki states that his device "maintains a constant phase shift between interfering lights." Because the device disclosed by Shirasaki does not maintain spatially distinct beams, it cannot independently phase shift its outputs; they must remain at constant phase.

3. The Arguments for Patentability Presented in Prior Responses are Reasserted

In so far as in the Advisory Action mailed March 17, 2009 the Examiner summarily dismisses without explanation Applicants' arguments for patentability presented in the Response Under 37 CFR 1.116 filed February 26, 2009, those arguments are repeated below. To the extent that the Examiner maintains any of the outstanding rejections and/or disagrees with Applicants' positions taken and statements made herein, it is respectfully requested that the Examiner specifically identify and address those points on which there continues to be disagreement.

For example, the Examiner has previously taken the position that:

> Regarding applicants' amendment and subsequent argument that Miron fails to teach a surface having a variable reflectivity that varies in reflectivity along its length, the examiner disagrees. As noted in the amended office action, Miron clearly provides a variable reflectivity surface that varies in reflectivity along its length in that, as previously noted, the spacing between the reflective layers is variable thereby allowing adjustment to the optical path difference (OPD) which is an even multiple of the elementary optical path difference (EOPD) and further allows control over optical intensity of the output beams (column 7 lines 1-10). Furthermore, the variable reflectivity surface can be broadly considered as being variably reflective along its length being that the light which propagates the length of the reflective surface encounters reflective materials which vary from fully reflective to partially reflective to fully reflective to partially reflective, etc.

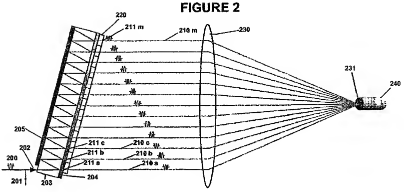
Office Action of November 26, 2008 at pages 8-9.

However, having a variable spacing between reflective layers is not the same as the layers or their surfaces having the claimed variable reflectivity surface which varies in reflectivity along its length. To hold otherwise is to ignore the language of the claim.

Applicants' claims include combinations of elements including surfaces having the claimed variable reflectivity surface which varies in reflectivity along its length. A full description of such a combination, including a variable reflectivity surface that varies in reflectivity along its length, is found, for example, in paragraphs 50 and 56 taken together with Figures 2 and 3 of the present application:

> [0050] ...The reflective coating of surface 204 preferably varies in reflectivity along its length, with high reflectivity at the start and decreasing along its length, so as to ensure equal intensity of the exiting beams. The reflectivity may also vary such as to impart any other desired amplitude profile onto the beams.

FIGURE 2



[0056] The reflective coating of surface 304 varies in reflectivity along its length, with high reflectivity at the start and decreasing along its length, so as to ensure equal intensity of the exiting beams. The reflectivity may also vary such as to impart any other desired amplitude profile onto the beams.

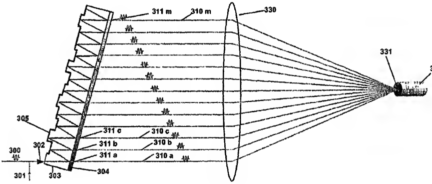


FIGURE 3

The rejected claims clearly describe a combination in which a variable reflectivity **surface** varies in reflectivity along its length. This is different from opposing optical planes, one of which is "totally reflective" and the other "partially reflective" or even having a distance between the planes adjustable so that there may be control over the optical intensity of an output beam. Contrary to the Examiner's position, this claim language is not satisfied by a configuration in which light propagates between surfaces of partially and fully reflective materials.

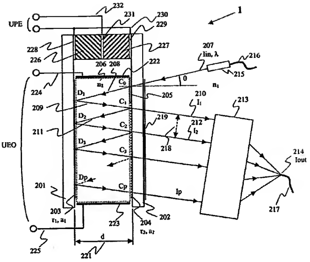


Figure 2a

With reference to Fig. 2a of Miron, 203 is described as a "totally reflective layer" while 204 as a "partially reflective layer." Neither is described as having a variable reflectivity that varies in reflectivity along its length. Miron simply fails to describe, suggest, or otherwise teach any variable reflectivity surface that varies in reflectivity along its length, i.e., the length of the surface. To hold that this is equivalent to having light propagate between layers of different reflectivity simply ignores the clear language of the claims and is otherwise baseless and improper. In as much as the Examiner recognizes and acknowledges that "Shirasaki fails to specifically teach …that the reflective surface is variable and varies in reflectivity along its length" (Office Action at page 4), it is clear that the combination of Shirasaki and Miron also fails to teach a combination including this feature for the reasons present above. Accordingly, the rejection of independent claims 1-3, 5-7 and 9-14 is improper and should be withdrawn.

Insofar as Shirasaki and Miron, singularly or in combination with each, do not disclose or suggest the subject matter of independent claims 1-3, 5-7 and 9-14, and insofar as the dependent claims rejected under 35 USC §103 all depend from one of these base claims, it follows that claims 4, 8 and 15-32 are also all are allowable.

Rejection of Claims 33-38 Under 35 U.S.C. §103(a)

Claims 33-38 were rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki in view of Miron and Ranalli USP 6,285,500. The rejection is respectfully traversed for the reasons set forth in the Amendment Under 37 CFR 1.111 filed September 3, 2008 and incorporated herein in its entirety, for the reasons present above in connection with claims 1-32, and for the reasons that follow.

As described above, the art of record, singularly or in combination, fails to describe or suggest a combination including a variable reflectivity surface which varies in reflectivity along its length and which is configured to impart a desired amplitude profile onto the output taps. The addition of Ranalli fails to cure this deficiency.

Further, as detailed in the previous Amendment, claims 33-38 recite a combination including a second input beam which projects at an angle to a plane of the optical tapped delay line linear array to interfere with each optical tapped delay line beam and establish a region of spatial overlap of the optical tapped delay line beams, and a two-dimensional photo detector array arranged to sample the interfering beams and spatially operate on the beams in the regions of spatial overlap. An example of this embodiment is described in paragraph 65 of the present application, in which two illuminations on the photo detector are tilted in phase as a result of the separation of two illumination sources such that the interference between them produces a single cycle of a spatial carrier across the four detector rows. This spatial carrier allows the detection of the complex correlation value.

A similar combination is neither disclosed nor suggested in Ranalli. Ranalli fails to teach or suggest using the interference of light. Ranalli solely uses the polarization differences to operate on the light, passing two light beams through the same space but with differing propagation directions so that they become spatially separable upon exit. In contrast, independent claims 33 and 36 and the claims dependent therefrom spatially operate on the light in the region of spatial overlap,

thereby taking advantage of the interference. A similar combination is neither disclosed nor suggested in Ranalli.

In response, the Examiner asserts:

> Regarding the newly added limitations dealing with spatial overlap, the examiner initially notes that Shirasaki discloses this limitation via disclosure of interfering collimated light 136 in Figure 7. Shirasaki, as previously discussed, also discloses the two-dimensional photodetector array which clearly operates on the beams in the regions of spatial overlap. Furthermore, the examiner maintains that the Ranalli reference allows the taps to interfere being that, as noted by applicants, the taps occupy the same position in space. As to applicants' assertion that the beams in Ranalli do not interfere since they are orthogonal, the examiner notes that Ranalli specifically teaches that:
>
> > "Beam combiner 44 creates two identical sets of superimposed wavelength channels (1s, 2p) incident focusing lens 46. By superimposing each of the s-polarized wavelength channels with its corresponding p-polarized wavelength channel, each superimposed wavelength channel includes the information payload from the first fiber wavelength channel (1s) and the second fiber wavelength channel (2p). Lens 46 focuses each superimposed wavelength channel onto its respective liquid crystal switch cell 22 to thereby combine the two identical sets of information into one superimposed wavelength channel incident on switch cell 22."
>
> In other words two optical wavelength signals having the same polarization occupy the nearly the same position in space, which, according to applicants produces interference. Furthermore, interference by definition is the superposition of two or more waves resulting in a new wave pattern. This is clearly the case in Figure 5 of Ranalli.

Office Action at pages 9-10.

However, contrary to the Examiner's assertion that the "two optical wavelength signals [have] the same polarization" and thus interfere, the cited portion of describes "superimposing each of the **s-polarized** wavelength channels with its corresponding **p-polarized** wavelength channel", i.e., optical wavelengths of **different** polarizations with p-polarization being light polarized in the plane, s-polarization being light polarized **perpendicular** to the p-polarized light.

As Ranalli, singularly or in combination with Shirasaki and/or Miron, fails to teach or suggest the combination of independent claims 33 and 36 and the claims dependent therefrom

including spatially operating on the light in the region of spatial overlap the rejection of claims 33-38 is further improper.

For the reasons presented above, claims 33-38 are allowable over the applied art and withdrawal of the outstanding rejection of those claims is respectfully solicited.

Summary

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark Office determines that an extension and/or other relief is required, applicants petition for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. **509622000700**.

Dated: August 27, 2009

Respectfully submitted,

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